



Medical NBC Briefing Series

Medical NBC Aspects of

Bubonic Plague





Purpose

- *This presentation is part of a series developed by the Medical NBC Staff at The U.S. Army Office of The Surgeon General.*
- *The information presented addresses medical issues, both operational and clinical, of various NBC agents.*
- *These presentations were developed for the medical NBC officer to use in briefing either medical or maneuver commanders.*
- *Information in the presentations includes physical data of the agent, signs and symptoms, means of dispersion, treatment for the agent, medical resources required, issues about investigational new drugs or vaccines, and epidemiology.*
- *Notes page.*

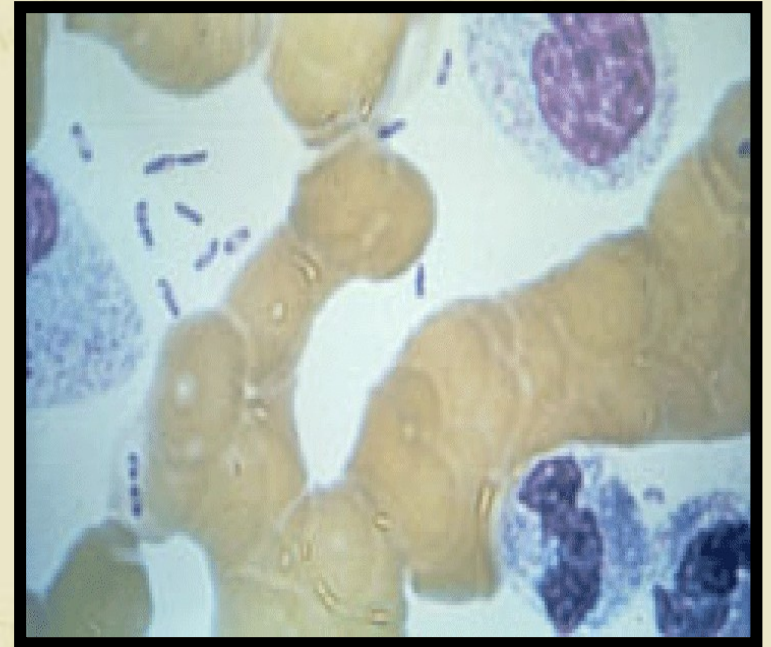


Office of the Surgeon General
for the Army



Outline

- **Background**
- **Battlefield Response**
- **Medical Response**
- **Command and Control**
- **Summary**
- **References**





Background

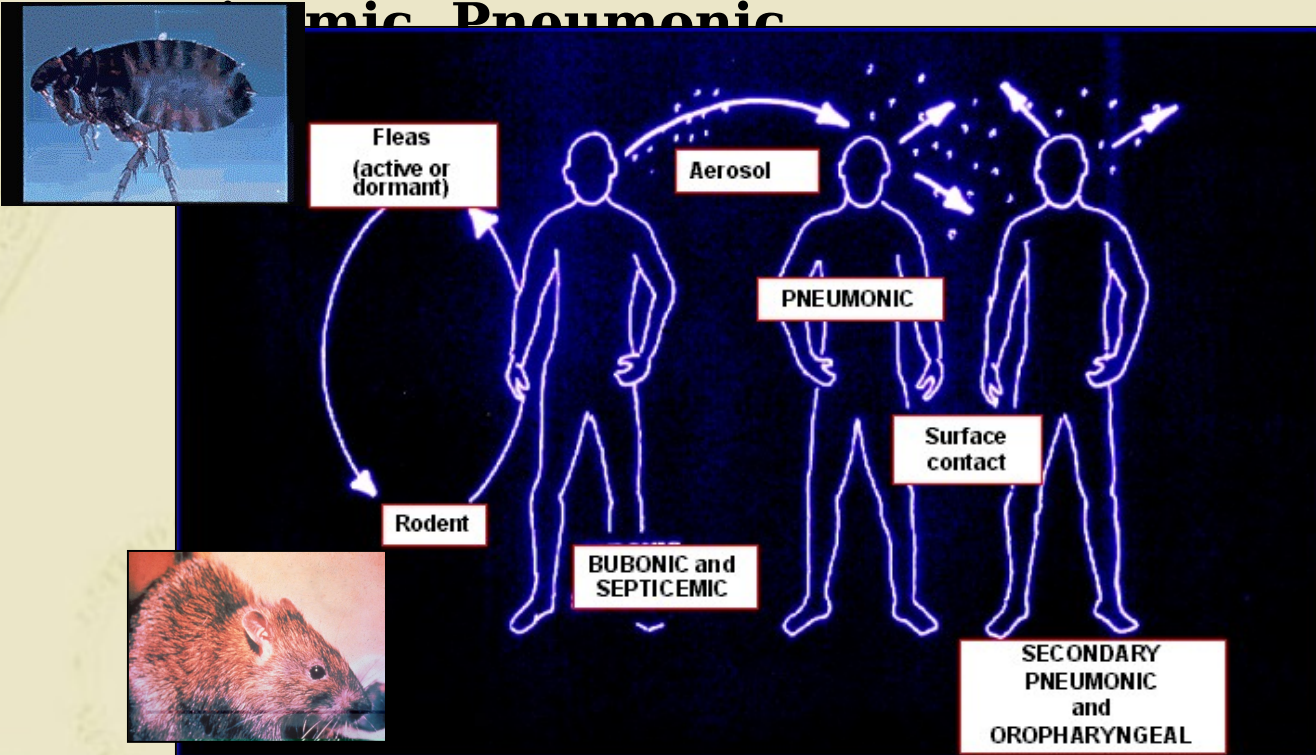
- **Disease Background**
- **History**
- **Bubonic Plague Disease Course Summary**
- **Signs and Symptoms**
- **Diagnosis**
- **Treatment**
- **Current Situation**
- **Weaponization**





Disease Background

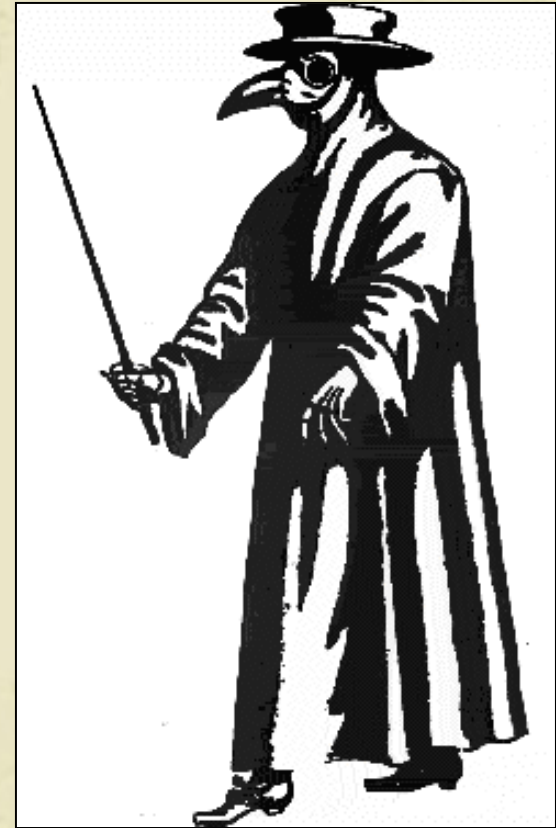
- Bacteria: *Yersinia pestis*
- Vector: flea (*Xenopsylla cheopis*)
- Three forms of Plague: **Bubonic**, Primary
pneumonic





History

- **Ancient - first cited in I Samuel V:6,9 - 1320 BC**
- **Major Pandemics**
 - 541 AD - Plague of Justinian
 - 1346 AD - 'Black Death'
 - 1894 AD - Modern Pandemic
- **200,000,000 deaths have been attributed to plague**
- **Bubonic plague has been the dominant manifestation**





Bubonic Plague Disease Course

Day 1 EXPOSURE	Cay 2	Day 3	Day 4	Day 5	Day 6	Day 7
Summary						
Ambulatory or littered based on severity of symptoms						
Acute malaise, high fever, chills, headache, nausea vomiting						
One or more tender lymph nodes						
Incubation on 2-10 DAYS						
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
Patients Littered						
Visible Bubo, intense pain, bladder distention, fright, confusion, anxiety						
incubation						
Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21
Patients Littered						
Development into systemic disease or pneumonic plague leading to death						
Airborne transmission from person to person						
Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28



Signs and Symptoms

- Sudden onset
- Flu-like syndrome - malaise, high fever
- Tender lymph nodes - buboes
- Inguinal lymph node involvement most common
- 50% mortality if untreated
- 80% are secondarily septicemic





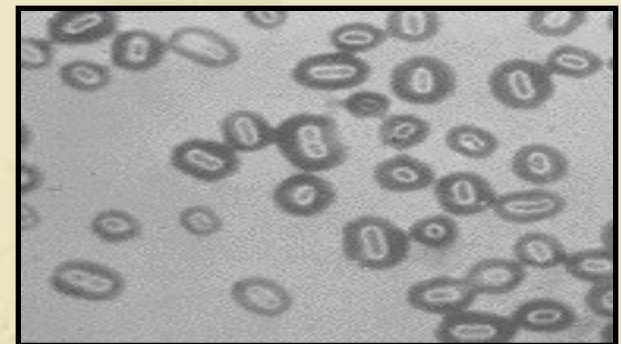
Signs and symptoms (cont.)





Laboratory Diagnosis

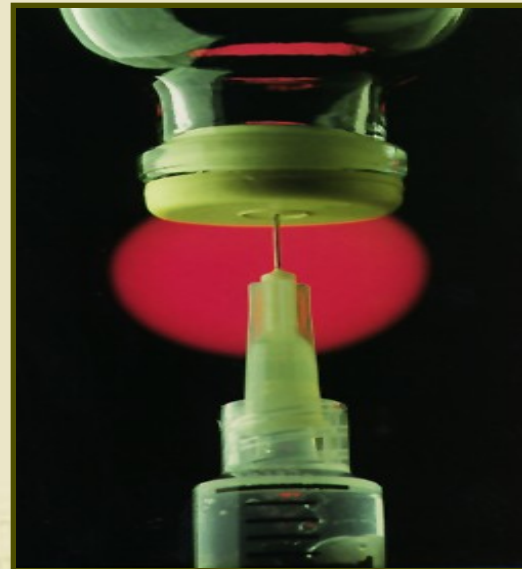
- Cultures from blood, sputum, and bubo aspirates
- Requires a minimum BL-2 laboratory with respiratory isolation protection
- Handling specimens should be with glove and mask precautions





Treatment - Prophylaxis

- **Plague vaccine**
 - 3doses:
 - Initial dose
 - 1 month
 - 6 months
- **Proven efficacy
for bubonic
plague only**





Treatment - Clinical



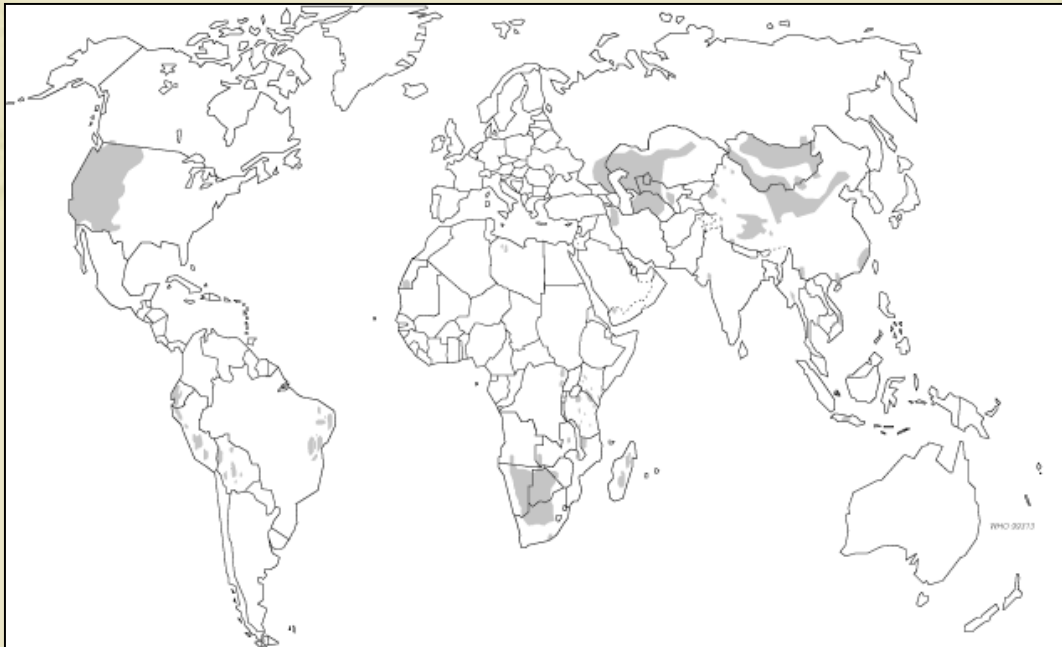
- **Supportive therapy**
 - I.V. crystalloids
 - Hemodynamic monitoring
 - Supplemental oxygen
 - Clinically significant hemorrhage is rare
 - I&D of buboes is usually contraindicated
- **Antibiotic therapy**



Current Situation

Worldwide Cases

- 1980 - 89 861 / year 11% mortality
- 1990 - 94 1974 / year 8%
mortality



The shaded areas show natural plague foci (in rodent populations).



Weaponization

- **Bubonic plague has been used as a biological weapons**
- **Use fleas to target humans and secondary transmission from rodents**
- **1346 - Black Sea Port of Kaffa**
 - Attacking forces catapulted bodies of plague victims over walls into city to cause epidemic





Weaponization (cont.)

- **Dr. Shiro Ishii - Manchuria (1933-45) Unit 731**
- **“Bare germs” vs. carrier fleas**
- **300 kg fleas (one billion) / month**
- **Plague epidemic in Changteh, China during WWII**
- **Post WWII weapons research focused on Pneumonic form**





Battlefield Response to Bubonic Plague

- Detect
- Protect





Detection

- **Possible methods of detection**
 - Detection of agent in the environment
 - Clinical (differential diagnosis)
 - Medical surveillance (coordination enhances detection capability)
- **PVNTMED personnel test water and food sources**
- **Diagnosis of Bubonic Plague is not presumptive of a BW attack - Bubonic plague may be endemic in the area of operation**



Detection of Agent in the Environment

- Biological Smart Tickets
- Enzyme Linked Immunosorbant Assay (ELISA) (Fielded with the 520th TAML)
- Polymerase Chain Reaction (PCR) (Fielded with the 520th TAML)





Detection of Agent in the Environment (cont.)

- M31E1 Biological Integrated Detection System (BIDS)
- Interim Biological Agent Detector (IBAD)





Clinical Detection

Sudden presentation of:

- Malaise, high fever, and one or more tender lymph nodes
- Rapid progression of symptoms may occur





Clinical Detection Laboratory Confirmation

- **Division medical assets lack lab equipment to conduct test to determine plague**
- **Specimen must be sent to theater level or CONUS lab**
- **Lab specimens should be submitted to the correct diagnostic laboratory**
 - Responsibility of the Lab Officer
 - Ensure the chain of command is aware of the situation
- **Contact lab prior to collection or**



Clinical Detection Laboratory Confirmation (cont.)

**Points of contact for biological sampling
and shipping**

- Corps Chemical Of
- Technical Escort U
- AFMIC
- 520th TAML
- USAMRIID
- WRAIR
- CDC





Detection Medical Surveillance



MARYLAND ARMY NATIONAL GUARD
DISCOM 29th Infantry Division (Light)
DIVISION MEDICAL OPERATION CENTER (DMOC)



Patient Summary Report 29th INF (L) DIV

From: Division Medical Operations Center (DMOC)
To: Division Surgeon

Date Time Group: From: 121200RJUN99
To: 202400RJUN99

PATIENTS

Nation	WIA	NBI	Disease	Neuropsychiatric Stress-Related	Total
US	0	97	55	0	152
Allied	0	0	0	0	0
EPW	0	0	0	0	0

DISPOSITION

Return to duty	148
Holding in Division's MTFs	0
Evacuated and returned	3
Evacuated by air	0
Evacuated by ground	1
Expired en route	0
Expired in MTF	0

Clues in the daily
medical disposition
reports

- Unexpected high numbers of fevers, malaise, lymph node tenderness



Protect Vector Protection

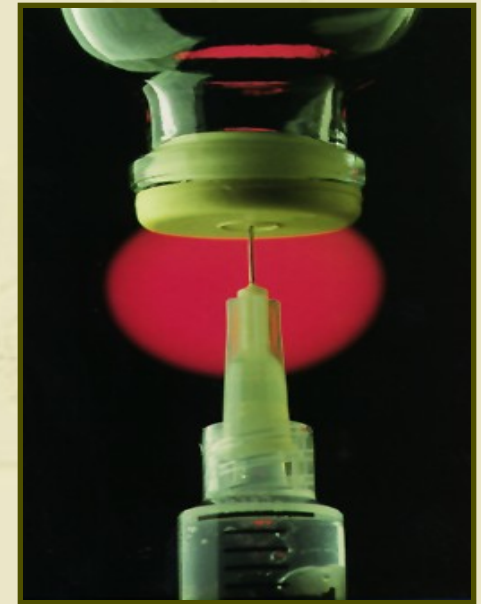
- Insect repellants containing DEET (N,N-diethyl-m-tolumaine) for skin
- Standard uniform clothing treated with insecticide sprays - permethrin
- Avoid dead animal and rodent nests





Protect Vaccinations

- **Plague vaccine**
- **World War II - No Known Cases**
 - All troops received vaccinations
- **Vietnam War**
 - Americans (8 cases) vs. Vietnamese (1,000's)
 - All soldiers vaccinated





Medical Response to bubonic plague

- Triage and Evacuation
- Infection Control
- Resource Requirements





Triage and Evacuation

- **Triage**
 - Priorities based on severity of symptoms
 - Respiratory support needs will increase priorities
- **Evacuation - Delayed or Immediate (depending on severity of symptoms)**
 - Required of all patients in Echelons I & II
 - Echelons III & IV based on priority
 - Standard evacuation assets may be used
 - Observe standard infection control



Evacuation or Quarantine



Figure 8-6. Arms carry.

- **Evacuation**
 - Plague patients not likely to RTD in the normal theater evacuation policy of 15 days
 - Strict interpretation of the doctrine calls for evacuation
- **Quarantine**
 - Contagious
 - Limit spread of the bacteria
 - Unlike smallpox, plague is already endemic to various parts of the world
- **Guidance**
 - Before evacuating patients suspected of plague, seek guidance from CINC

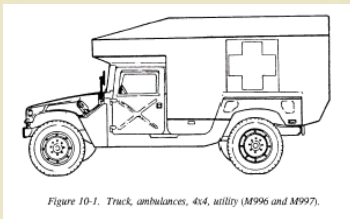


Figure 10-1. Truck, ambulances, 4x4, utility (M996 and M997).



Infection Control

- **Mass immunization**
- **Plague is communicable from person to person with respiratory involvement - patients must be strictly isolated**
- **Universal precautions including respiratory precautions apply for patient handling**
- **Control of rodent population (PVNTMED)**
- **Care of patient remains - Quartermaster section**
- **Disinfection of areas and articles soiled by respiratory secretions**



Resource Requirements

- **Evacuation Assets**
- **Supportive therapies**
 - IV antibiotics
 - Hemodynamic monitoring
- **Intensive care facilities for severe cases**
- **Isolation areas for infected individuals**
- **Quarantine, if imposed, would strain the supply chains**





Command and Control

- **Intelligence**

- Medical surveillance and intelligence reports are key to keep the Command alert to the situation

- **Evacuation of the sick or Quarantine**

- **Maneuver**

- Quarantine may be necessary for identified cases

- **Logistics**

- Additional Class VIII materials will be required and evacuation routes to Echelon III will be heavily utilized

- **Manpower**

- An outbreak of bubonic plague may significantly reduce manpower in a short period of time



Command and Control Response to Psychological Impact

- **May vary from person to person**
- **Psychological Operations**
 - Rumors, panic, misinformation
 - Soldiers may isolate themselves in fear of disease spread
- **Countermeasures**
 - LEADERSHIP is responsible for countering psychological impacts through education and training of the soldiers
 - Implementation of defensive measures such as crisis stress management teams



Summary

- **Bubonic plague is highly infectious and can be transmitted from person to person**
- **Bubonic plague has been weponized**
- **Detection may not occur until after exposure when patients are reported**
- **Command decisions that will be required upon detection of bubonic plague:**
 - Evacuation or quarantine
 - Treatment: Procuring additional medical supplies
 - Infection Control: Elimination of vector sources.



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